

Northeast Africa 001

Anorthositic regolith breccia

262 g



Figure 1: Northeast Africa 001 illustrating. Image is from Haloda et al. (2006b). Width of sample is 10 cm.

Introduction

Northeast Africa (NEA) 001 (Fig. 1) was found in Sudan in April 2002, near the Libya-Egypt-Sudan border (Fig. 2). It has no fusion crust, and extensive terrestrial alteration products around the edges and in cracks, include calcite, barite, gypsum, and Fe hydroxides. It is an anorthositic regolith breccia consisting of mineral fragments and lithic clasts in a microcrystalline impact melt matrix (Fig. 3; Russell et al., 2005; Haloda et al., 2006b).

Petrography and mineralogy

The lithic clasts in NEA001 are up to 1 cm in size, and are dominantly anorthositic (Fig. 4a-e). Breccia-in-breccia textures are common, and glass fragments, spherules, and basaltic fragments are also present (Fig. 4f). Plagioclase feldspar compositions are between An₉₂ and An₉₉ (Russell et al., 2005; Haloda et al., 2006b). Some pyroxene mineral fragments contain fine-grained exsolution, and there are also pyroxferrites that

have broken down into silica-hedenbergite-fayalite intergrowths. Pyroxene compositions for the lithic clasts are largely En_{60-70} , augites have Mg\# of approximately 0.75 (Fig. 5). Accessory minerals include MgAl spinel, chromite, ilmenite, troilite, FeNi metal, and silica.

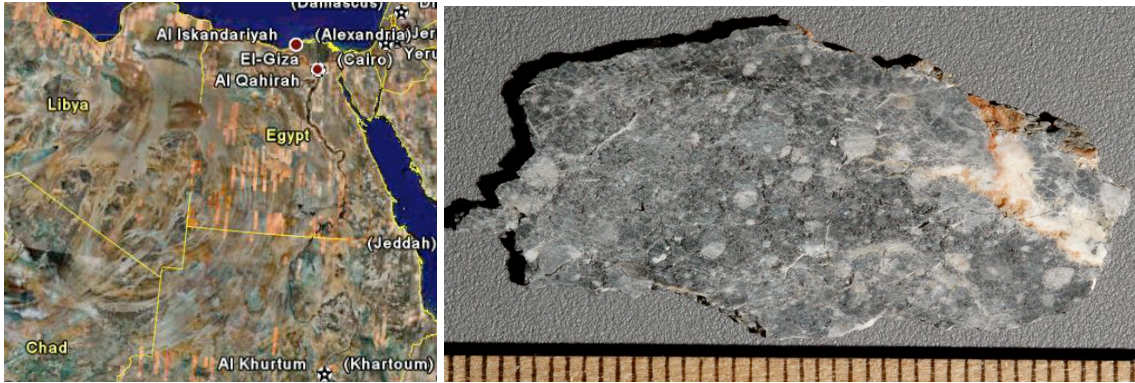


Figure 2: Region of Northeast Africa in which the sample was found.

Figure 3: Slab of NEA001 showing many feldspathic clasts and terrestrial weathering at the top edge. Divisions on scale are 1 mm (photo from R. Korotev).

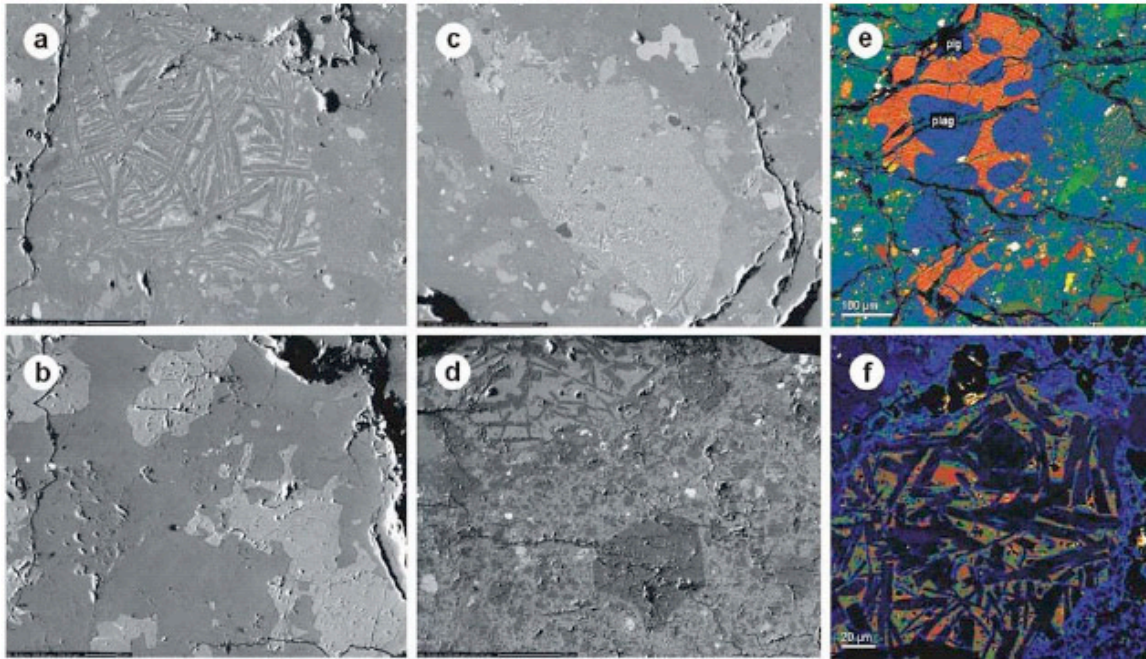


Figure 4: Back scattered electron images of clasts in NEA 001 illustrating the lithologic diversity of the clasts: (a) plagioclase/glass 200 micron wide; (b) anorthositic clast (230 micron); (c) devitrified glass fragment within the regolith breccia; (d) impact melt breccia; (e) false color back scattered electron(BSE) image of a primary gabbroic clasts of the ferroan highlands suite; (f) false color BSE image of a basaltic clast (from Haloda et al., 2006b).

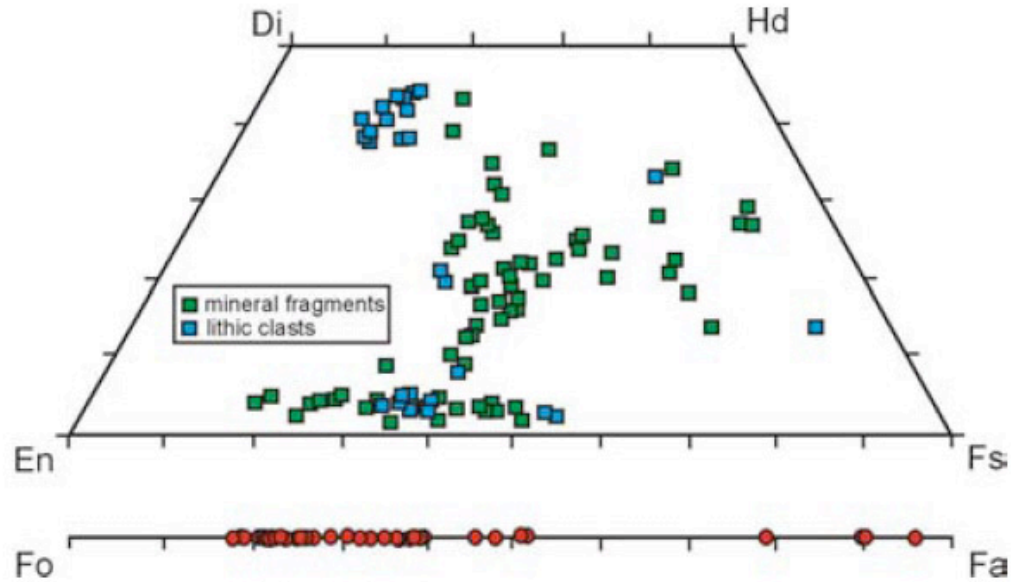


Figure 5: Olivine and pyroxene compositions from mineral fragments and lithic clasts from NEA 001 (from Haloda et al., 2006b).

Chemistry

NEA 001 has a composition similar to other feldspathic breccias, but is at the high FeO, Sc and Cr end of the group (Fig. 6). The high Sc and low Cr/Sc, together with the FeO, Th and CaO contents demonstrate that NEA001 is FAN-rich with only a minor mare basalt component and little to no KREEP component.

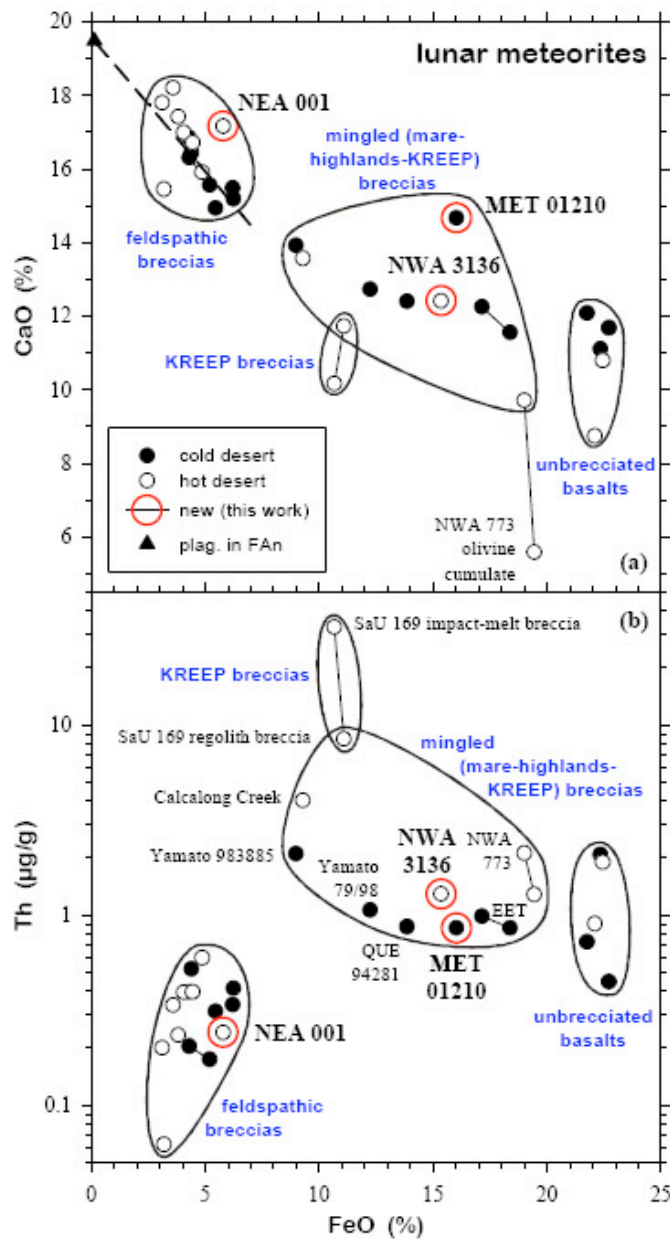


Figure 6: CaO, FeO and Th contents of NEA001 compared to other feldspathic breccias, mingled, and basaltic lunar meteorites (from Korotev and Irving, 2005).

Radiogenic age dating

None yet reported.

Cosmogenic isotopes and exposure ages

None yet reported.